Aquatic Invasive Species Early Detection, Monitoring, and Control Annual Report

Abstract: Aquatic invasive species (AIS) are non-native species capable of degrading natural resources, causing harm to water-based infrastructure, and diminishing recreational opportunities. The Montana Fish, Wildlife & Parks AIS Bureau conducts early detection surveys to pinpoint new AIS populations, enabling containment or potential eradication. This report provides a summary of the 2023 sampling season's early detection and monitoring survey initiatives for aquatic invasive species, undertaken by Montana Fish, Wildlife & Parks and collaborative partners, along with updates on control and eradication projects.

2023 Report Highlights

- Provide results of AIS early detection efforts
- Foster a greater understanding of the threats of AIS to Montana's waters
- Encourage partners and others to sample, report, and look for AIS invaders
- Highlight eradication and control projects

One of FWP's early detection technicians, Brian Hagan, collects a plankton sample that will later be analyzed for the presence of invasive Dreissenid mussel larvae

The Montana Fish, Wildlife & Parks (FWP) Aquatic Invasive Species Bureau implements an AIS Management Plan, encompassing coordination, prevention of new introductions, early detection, monitoring, control, eradication, and outreach and education. The plan aims to mitigate the detrimental effects of AIS by preventing and managing their introduction, spread, and impact within and from Montana.

Report Contents

Compiled and produced by:

Craig McLane
AIS Early Detection Coordinator – AIS Bureau
Jayden Duckworth
AIS Environmental Scientist– AIS Bureau
Ryan Callison
AIS Environmental Scientist – AIS Bureau
Keegan Effertz
AIS Lead Lab Technician– AIS Bureau
Stacy Schmidt
AIS Environmental Scientist Supervisor – AIS Bureau
Katie Richter
AIS Lab Technician – AIS Bureau

Early Detection and Monitoring – Background

Aquatic Invasive Species (AIS) pose significant economic, ecological, and recreational threats to Montana's waters. The preservation of Montana's waters hinges on effective prevention measures to curb the introduction and spread of AIS. In cases where prevention proves insufficient, early detection is critical to prevent further spread. Montana Fish, Wildlife & Parks (FWP) initiated its statewide AIS early detection and monitoring program in 2004. This program empowers FWP biologists to identify small or localized AIS populations, scrutinize suspicious reports, and analyze existing population trends. Surveys can result in eradication treatments or the formulation of long-term control and management strategies. FWP's survey initiatives encompass a range of AIS species, whether present or absent in Montana, including zebra and quagga mussels, Corbicula clams, New Zealand mudsnails, faucet snails, Eurasian watermilfoil, flowering rush, curlyleaf pondweed, and fragrant waterlily. Further details, including past reports, standard operating procedures for sampling, and management plans, can be accessed in the "Resources" and "Reports" sections at https://cleandraindry.mt.gov/.

Early Detection and Monitoring Methods

To maximize sampling efforts, FWP evaluates the risk of AIS introductions to waterbodies. An annual work plan guides these efforts but remain adaptable due to the constantly evolving variables used to assess risk. Site prioritization depends on factors such as previous years' sampling efforts and detections, water calcium levels, water quality data, angler pressure data, and input from partners.

Figure 1. Brian Hagan, FWP Early Detection Technician conducts all species AIS Surveys on Hauser Lake.

Sampling Methods

To capture a diverse range of species, FWP utilizes a variety of survey methods in addition to its standard dreissenid sampling. These methods encompass plankton nets, kick nets, dredges, benthic sleds, plant rakes, shoreline visual surveys, visual surveys, artificial substrate samplers, rock picking, mussel detection dogs, eDNA, snorkeling, and scuba diving. A comprehensive description of Montana's survey methods is outlined in the AIS Field Sampling and Lab Operating Procedures (Montana Fish, Wildlife & Parks, 2019).

Figure 2. Paul Bramblett, FWP AIS Area Supervisor, searches the underside of a pier for any attached invasive mussels.

AIS Sampling Prior to Fish Transfers

The transfer of fish between hatcheries or water bodies can facilitate the spread of AIS, involving invasive plants, snails, clams, mussels, and pathogens. FWP moves large numbers of fish through both its hatchery and wild fish transfer efforts. Certification for the sale or movement of fish is contingent upon passing an AIS inspection and fish health inspection for commercial, federal, and state hatcheries. The FWP Fish Health Laboratory collaborates closely with the FWP AIS Bureau to annually inspect all federal, state, and commercial hatcheries, as well as waterbodies used for wild fish stock transfers. AIS inspections involve on-site surveys and fish disease/pathogen testing. For details on pathogen sampling protocols and findings, contact the fish health coordinator, Ken Staigmiller (kstaigmiller@mt.gov).

Hatchery-specific standard operating procedures (SOPs) ensure optimal detection probabilities for new invasive species populations. These strategies target areas for improving biosecurity at hatchery facilities to mitigate the risk of AIS spread.

2023 AIS Sampling Efforts and Results

Montana Fish, Wildlife & Parks conducts comprehensive surveys for all AIS taxa across various waterbodies, including lakes, reservoirs, ponds, creeks, and rivers. High-risk sites undergo annual surveys, with more frequent sampling at sites deemed to have the highest risk. Lower-risk sites receive less frequent visits based on the potential for AIS introduction. Most sampling sites involve plankton sampling, along with surveys targeting invasive plants, snails, crayfish, clams, and other invertebrates.

In 2023, FWP and partners surveyed over 350 waterbodies (Figure 3 and Figure 4), with the majority undergoing comprehensive AIS surveys for all taxa. Specific details regarding individual waters or areas can be downloaded through FWP's GIS data page at https://gis-mtfwp.hub.arcgis.com/.

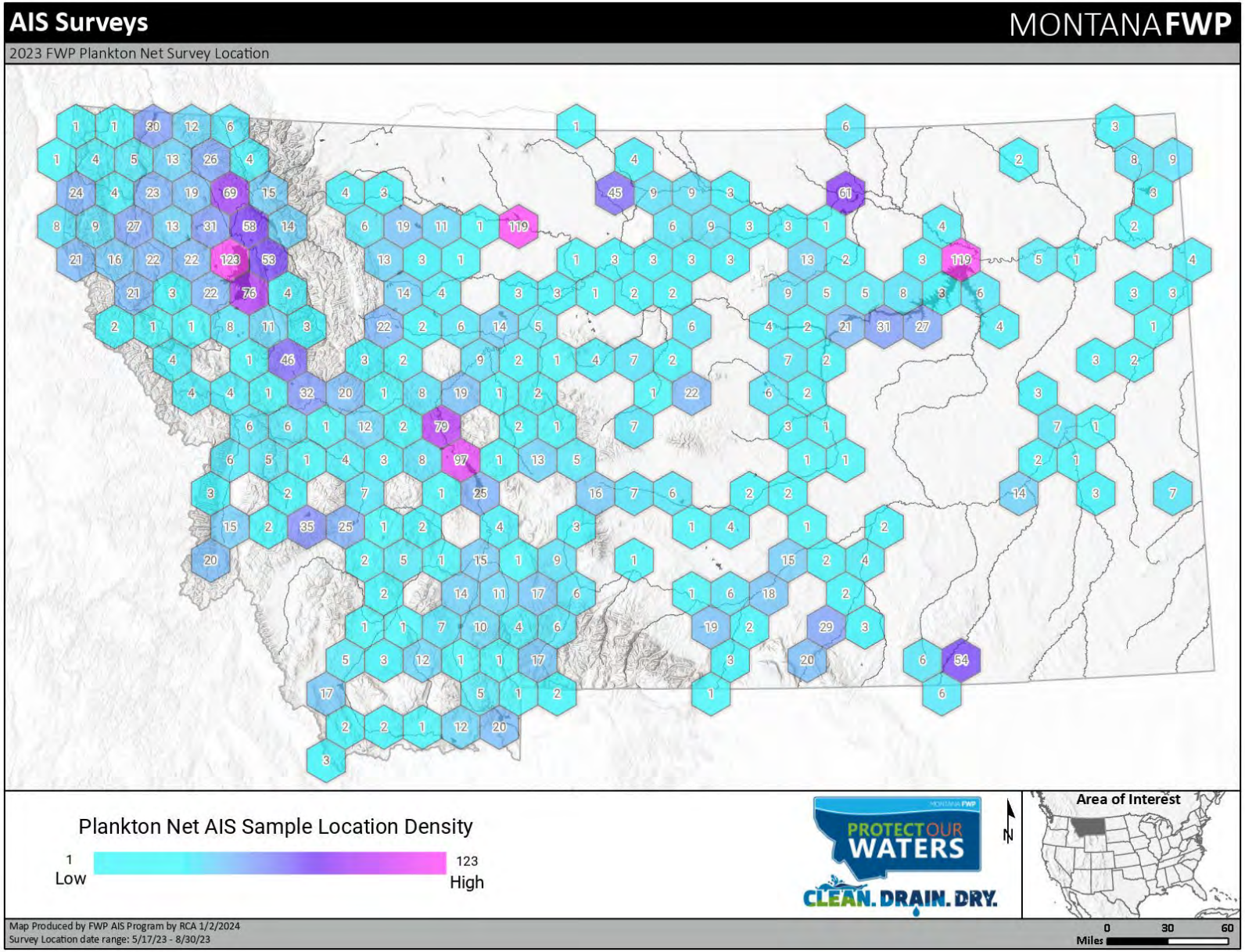


Figure 3. Map of FWP AIS plankton sampling intensity, 2023.

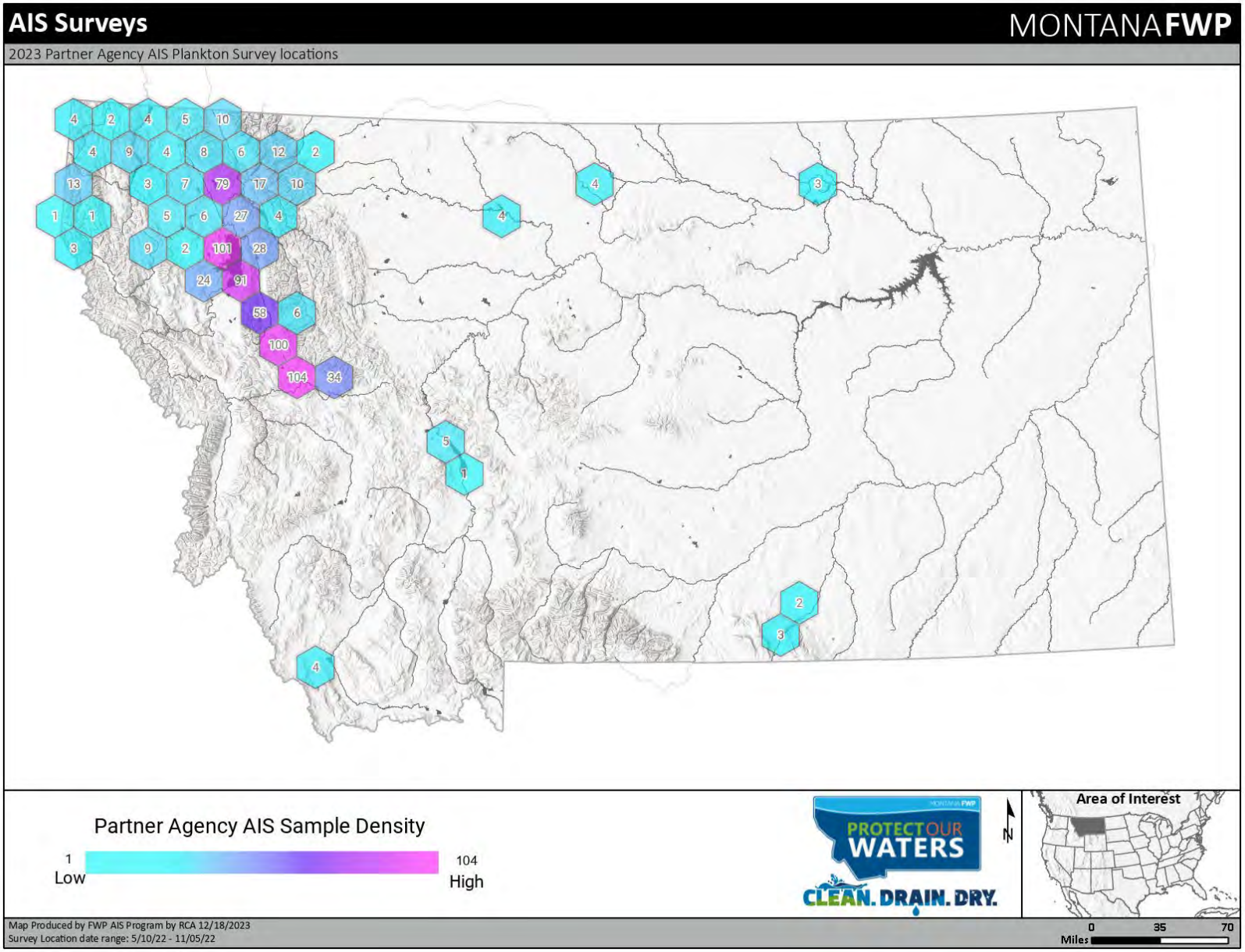


Figure 4. Mussel veliger sampling effort by partners in 2023.

Dreissenid Mussel (Zebra and Quagga Mussels) Sampling Results

There is no evidence of dreissenid mussels detected in 2023 from any survey or sample processed. Plankton samples undergo analysis at FWP's AIS Early Detection lab. Figure 5 illustrates the distribution of plankton sampling efforts by each entity. In total, FWP and partners collected 3,181 plankton samples from Montana waters. While the majority of samples are gathered by FWP, contributions from partners play a crucial role in statewide sampling. FWP is committed to close collaboration with partners, including training new entities, to enhance AIS sampling at the local level.

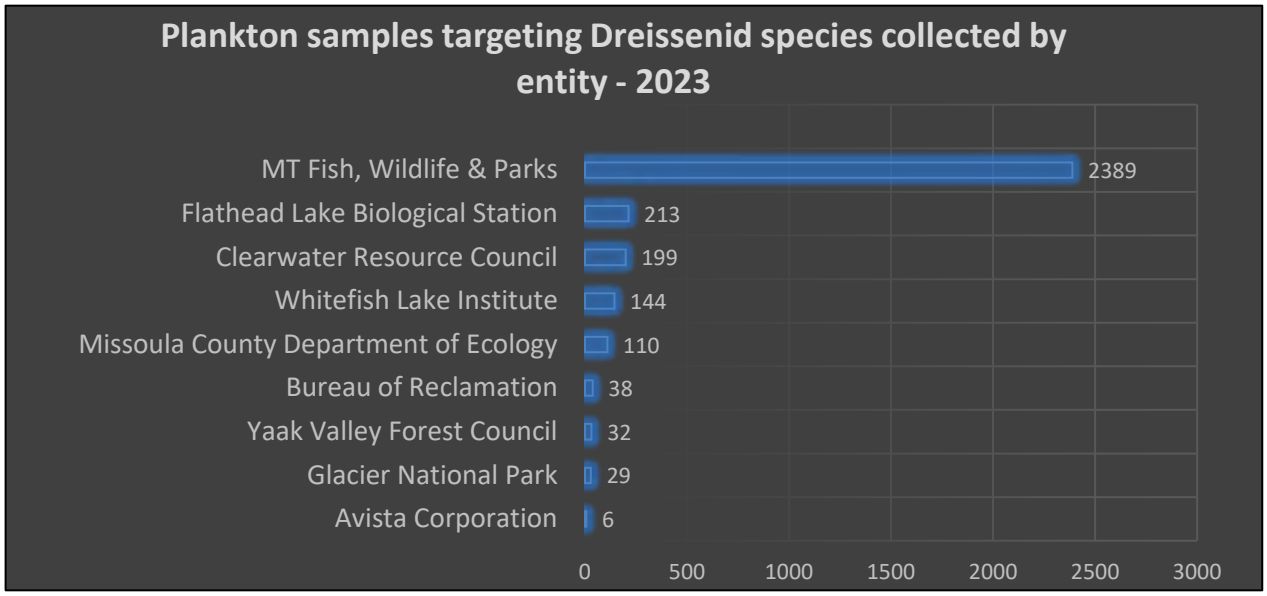


Figure 5. 2023 aquatic invasive species plankton sampling effort by all reported entities.

New Detections in 2023

FWP tracks the distributions of AIS across Montana. FWP technician and/or partners discover new populations each year. In 2023, new detections of AIS included the following locations:

- Mud Bithynia (Bithynia tentaculata)
  - Blanchard Lake – Whitefish, MT
- New Zealand mudsnails (*Potamopyrgus antipodarum*)
  - Silver Bow Creek – Warm Springs, MT
  - Roe River – Great Falls, MT
- Big-eared radix (*Radix auricularia*)
  - Flathead Lake – Polson, MT
  - Pablo Reservoir – Pablo, MT
- Eurasian watermilfoil (*Myriophyllum spicatum*)
  - Thompson Park Pond – Thompson Falls, MT
- Curlyleaf pondweed (*Potamogeton crispus*)
  - Horte Reservoir – Ronan, MT
  - The Lakes Subdivision Pond – Bozeman, MT
  - Missoula Kids Pond – Missoula, MT

Environmental DNA (eDNA) Sampling

In 2023, FWP elevated the use of eDNA to a programmatic level, building upon successful trials in 2022. Employing molecular technology, eDNA sampling detects species DNA within the water column of a waterbody. While a positive eDNA result alone doesn't confirm the presence of invasive species, such as mussels, it prompts more intensive sampling in that water. This additional tool enhances the state's capacity to detect, respond to, contain, and control new populations. FWP intends to continue and broaden its use as appropriate. FWP gathered 179 eDNA samples across 31 highest-risk lakes (Figure 6). The collective effort between partners and FWP yielded over 400 samples targeting dreissenid species, with partners also contributing additional samples targeting other AIS species.

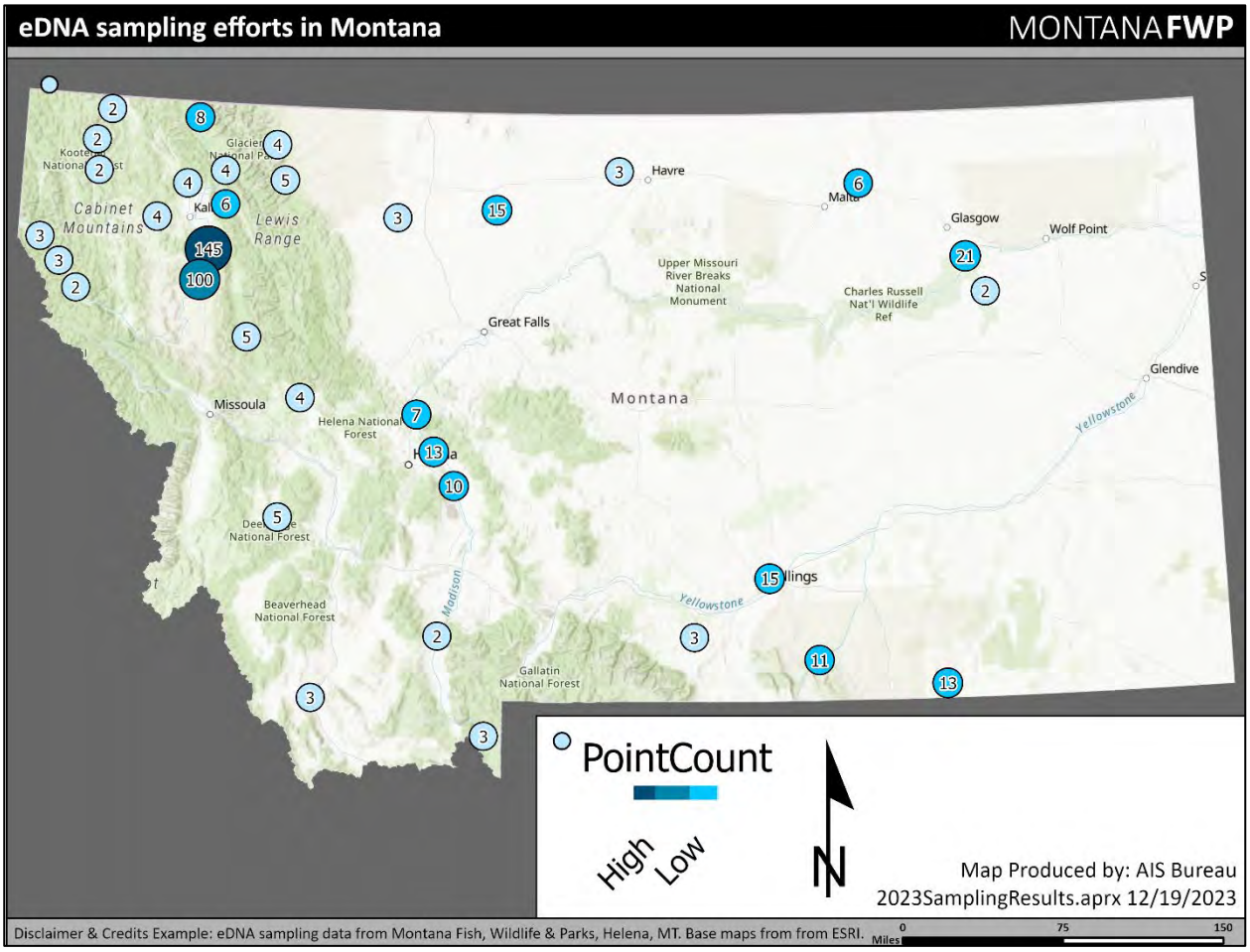


Figure 6. Environmental DNA (eDNA) sampling in Montana for 2023.

AIS Distributions in Montana

The tables below document the locations of known AIS. Absence of observations for a species in 2023 does not necessarily imply its absence or eradication; it simply indicates that the species was not collected during the sampling efforts this year. The lack of observations may be attributed to factors such as low species abundance, oversight by sampling crews, or a focus on different areas of the waterbody where the species may not be present. For visual representations of current AIS locations in Montana, please refer to Appendix A and Appendix B.

Animals

Corbicula clam *(Corbicula fluminea)*

Waterbody where previously found	Observed during 2023 sampling efforts	Corbicula clam larvae (plankton sampling)
Lake Elmo	NO	NO

New Zealand mudsnails *(Potamopyrgus antipodarum)*

Waterbody where previously found	Observed during 2023 sampling efforts
Beaverhead River	YES
Beavertail Pond	Not Sampled
Big Sheep Creek	Not Sampled
Bighorn River	NO
Bitterroot Fish Hatchery Ponds	NO
Bluewater Creek	YES
Bluewater Fish Hatchery	NO
Bozeman Creek	Not Sampled
Clark Canyon Reservoir	NO
Darlington Ditch 1	YES
Ennis Lake	NO
Gardner River	Not Sampled
Hauser Reservoir	NO
Irrigation Canal in Billings	Not Sampled
Jefferson River	NO
Madison River	NO
Marias River (below Tiber Dam)	NO

Waterbody where previously found	Observed during 2023 sampling efforts
Missouri River (below Holter Dam)	YES
Mitchell Slough	NO
Nicholia Creek	Not Samples
Nelson Spring Creek	Not Sampled
Odell Creek	Not Sampled
Poindexter Slough	NO
Quake Lake	NO
Rainbow Dam Reservoir	NO
Red Rock River	YES
Roe River*	YES
Ruby River	Not Sampled
Silver Bow Creek*	YES
Spring Meadow Lake	YES
Upper Holter Lake	NO
Wayne Edsall Pond	NO
Yellowstone River	NO
Yellowtail Afterbay Reservoir	NO

* = New find in 2023

Mud Bithynia/Faucet snail (*Bithynia tentaculata*)

Waterbody where previously found	Observed during 2023 sampling efforts
Blanchard Lake (Near Whitefish)	YES*
Browns Lake	NO
Flathead Lake	NO
Georgetown Lake	YES
Lake Frances	NO

Waterbody where previously found	Observed during 2023 sampling efforts
Lost Loon Lake (Lost Coon Lake)	NO
McWennegar Slough	YES
Smith Lake	YES
Upsata Lake	YES
Whitefish Lake	YES

* = New find in 2023

Red-rim melania snail (*Melanoides tuberculatus*)

Waterbody where previously found	Observed during 2023 sampling efforts
Beaverhead River	NO
Gardner River	Not Sampled

Waterbody where previously found	Observed during 2023 sampling efforts
Powder River	Not Sampled
Warm Spring Ditch adjacent to Beaverhead River	Not Sampled

Big-eared radix (*Radix auricularia*)

Waterbody where previously found	Observed during 2023 sampling efforts
Bitterroot River	YES
Ennis Lake	NO
Flathead Lake*	YES
Harpers Lake	NO

Waterbody where previously found	Observed during 2023 sampling efforts
Lee Metcalf NWR	Not Sampled
Pablo Reservoir	YES
Pond 1 (Canyon Ferry Wildlife Management Area)	Not Sampled

* = New find in 2023

Southern plains crayfish (*Procambarus simulans*)

Waterbody where previously found	Observed during 2023 sampling efforts
Miles City Fish Hatchery	YES

Plants

Eurasian watermilfoil (*Myriophyllum spicatum*)

Waterbody where previously found	Observed during 2023 sampling efforts
Beaver Lake	NO
Cabinet Gorge Reservoir	YES
Clark Fork River (below Thompson Falls Reservoir)	NO
Fort Peck Dredge Cuts	YES
Fort Peck Lake	YES
Fort Peck Powerhouse Tailrace	YES
Fort Peck Trout Pond	YES
Jefferson River	NO
Jefferson Slough	YES

Waterbody where previously found	Observed during 2023 sampling efforts
Madison River (downstream of I-90)	YES
Missouri River (upstream of Canyon Ferry Reservoir, includes Toston Dam)	YES
Missouri River (downstream of Fort Peck Dam)	YES
Nelson Dredge	YES
Nilan Reservoir	NO
Noxon Rapids Reservoir	YES
Pablo Reservoir	YES
Pond 4 - Canyon Ferry	Not Sampled
Thompson Park Pond	YES

* = New find in 2023

Flowering rush (*Butomus umbellatus*)

Waterbody where previously found	Observed during 2023 sampling efforts
Cabinet Gorge Reservoir	YES
Church Slough	YES
Clark Fork River	YES
Fennon Slough	Not Sampled

Waterbody where previously found	Observed during 2023 sampling efforts
Flathead Lake	YES
Flathead River	YES
Noxon Rapids Reservoir	YES
Thompson Falls Reservoir	YES

Spiny waternymph (*Najas marina*)

Waterbody where previously found	Observed during 2023 sampling efforts
Frenchtown Pond	Yes

Fragrant waterlily (*Nymphaea odorata*)

Waterbody where previously found	Observed during 2023 sampling efforts
Blanchard Lake (near Whitefish)	YES
Blanchard Lake (Clearwater River)	NO
Browns Lake	NO
Clearwater River	YES
Duck Lake (NW MT)	Not Sampled
Elbow Lake	Not Sampled
Harpers Lake	NO
Hidden Lake	YES
Holland Creek	YES
Holland Lake	YES
Lake Alva	NO

Waterbody where previously found	Observed during 2023 sampling efforts
Lake Inez	NO
Lake Mary Ronan	NO
Lindbergh Lake	NO
Loon Lake	YES
Placid Lake	YES
Salmon Lake	YES
Savage Lake	YES
Seeley Lake	YES
Swan Lake	NO
Upsata Lake	YES

Curlyleaf pondweed (*Potamogeton crispus*)

Waterbody where previously found	Observed during 2023 sampling efforts
Beaverhead River	NO
Big Elk Creek	Not Sampled
Bitterroot River	YES
Bozeman Creek	Not Sampled
Cabinet Gorge Reservoir	YES
Canyon Ferry Reservoir	NO
Clark Canyon Reservoir	NO
Clark Fork River	YES
Darlington Ditch	YES
Deadman's Basin	NO
East Gallatin River	NO
Ennis Lake	YES
Ester Lake	Not Sampled
Fifth Street Pond (Libby)	Not Sampled
Flathead Lake	YES
Flathead River	YES
Fort Peck Lake	NO
Frog Pond	Not Sampled
Gallatin River	YES
Haskill Creek*	YES
Hauser Reservoir	YES
Hebgen Lake	NO
Helena Valley Regulating Reservoir	YES
Holter Reservoir	YES
Horte Reservoir*	YES
Jefferson River	NO
Judith River	NO
Kicking Horse Reservoir	Not Sampled
Kootenai River	YES
Lake Helena	YES
Lower Crow Reservoir	Not Sampled

Waterbody where previously found	Observed during 2023 sampling efforts
Lower Glaston Lake	Not Sampled
Madison River	YES
Marias River	NO
Mission Reservoir	Not Sampled
Missoula Kids Pond*	YES
Missouri River	YES
Mitchell Slough – East Canal	YES
Musselshell River	YES
Newlan Creek	Not Sampled
Newlan Reservoir	NO
Ninepipe Reservoir	Not Sampled
Noxon Rapids Reservoir	YES
Pablo Reservoir	NO
Pond 1 – Canyon Ferry	Not Sampled
Pond 2 – Canyon Ferry	Not Sampled
Pond 3 – Canyon Ferry	Not Sampled
Pond 4 - Canyon Ferry	Not Sampled
Post Creek	YES
Quake Lake	NO
Rainbow Dam Reservoir	NO
Sheep Creek	Not Sampled
Shields River	NO
Slip and Slide Creek (Ponds)	YES
Smith River	YES
The Lakes Subdivision Pond*	YES
Thompson Falls Reservoir	NO
Tiber Reservoir	YES
Triangle Pond	Not Sampled
Upper Holter Lake	NO
Wayne Edsall Pond	YES

* = New find in 2023

Aquatic Invasive Species Laboratory

FWP operates the AIS Early Detection Laboratory in Helena, MT, with a satellite lab in Kalispell, MT, processing plankton samples for FWP crews and partners in Montana and the Missouri River Basin (MRB) states. Additionally, these labs offer confirmatory services for samples received from outside the basin. Staff focus on identifying AIS within plankton samples, particularly mussel veligers (larvae). Figure 7 depicts the annual sample volume handled by the labs since 2005. The labs regularly identify new populations of dreissenid mussel veligers and invasive Corbicula clam veligers downstream in multiple states. To ensure result reliability, the labs undergo regular internal and external quality control testing. In 2023, the labs processed 3,614 samples (3,143 - MT, 471 - Missouri River Basin). Turnaround times for in-state samples average 18 days for high-priority samples and 26 days overall (Table 1).

Table 1. The average turnaround time for plankton samples is a key focus for FWP. Rapid detection of invasive species enables the state to promptly respond and implement necessary measures. FWP is committed to expeditiously processing samples from the highest-risk waterbodies susceptible to invasive mussel introduction,

Risk Priority (1- high; 10- low)	Turnaround Time (Average Days)	Total # Samples
1	18	921
2	31	921
3	21	413
4	18	192
5	38	162
6	42	309
7	27	152
8	12	39
9	32	34
10	-	0
In-State Totals	**26**	**3143**
Out-of-state	Still Pending	**471**

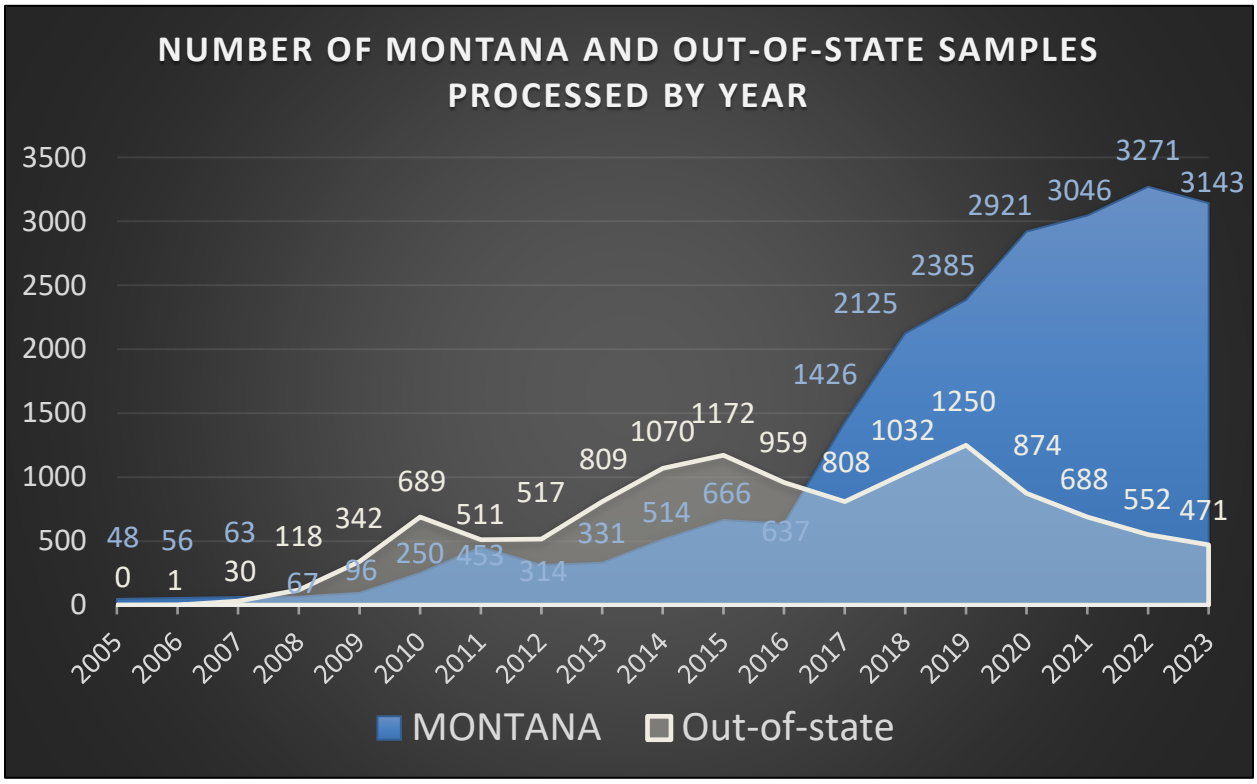


Figure 7. Number of plankton samples processed by year: in-state (FWP and partners) vs. out-of-state.

AIS Early Detection Trainings/Workshops

FWP has made a conscious effort to increase the opportunities for partners and the public to be trained formally or informally in the detection methods for AIS. FWP hosted, co-hosted, or participated in workshops across the state including the following trainings:

Date	Event Details	Location
March 6-8	Provided technical expertise for Missoula County's AIS Short Course	Missoula
April 29	AIS training for Whitefish Lake Institute's volunteers	Kalispell
May 9-10 May16-19	AIS Bureau Sampling Training	Helena and Fort Peck
June 1	Madison Stream Team	Ennis
June 5-6	Early Detection Training (Co-hosted with Flathead Lake Biological Station)	Flathead Lake
June 7	Early detection training with Confederated Salish and Kootenai Tribes	Polson
June 13	Eastern Montana Early Detection Workshop #1 (Hosted by Central and Eastern Montana Invasive Species Team (CEMIST)	Miles City
August 3	New Zealand mudsnail survey field day on Silver Bow creek with Trout Unlimited	Warm Springs
August 9	Eastern Montana Early Detection Workshop #2 (Hosted by Central and Eastern Montana Invasive Species Team (CEMIST)	Harlowton
Aug 22	Participated in Eurasian watermilfoil delineation efforts with Confederated Salish and Kootenai Tribes	Pablo Reservoir
Aug 29	AIS Field day with Blackfeet Tribal Employees	Blackfeet Nation
Oct 19	Early detection sampling day with Yellowstone National Park	Mammoth
Oct 19-21	Stem in the Rockies: Aquatic Invasive Species Workshop (Co-hosted with Flathead Lake Biological Station, and CEMIST	Flathead Lake

Figure 9. FWP's AIS AmeriCorps, Sophiane Nacer, learns to identify macroinvertebrates at an AIS Early detection training in Spring, 2023.

Figure 8. Ryan Callison (right), FWP AIS specialist, helps students identify species during an AIS early detection training.

AIS Control Efforts

Beaver Lake Eurasian Watermilfoil Eradication

In 2023, FWP continued its efforts to eradicate Eurasian watermilfoil at Beaver Lake in northwest Montana. Since its detection in 2011, FWP, along with the City of Whitefish and the Whitefish Lake Institute, has diligently worked to eliminate this invasive plant and prevent its further spread within the lake and nearby waters. In 2022, all benthic barriers were removed following an intensive removal initiative targeting a few plants near the boat ramp. This year represents a significant milestone for the eradication project, with no Eurasian watermilfoil found within the lake. The FWP dive team conducted thorough surveys on four occasions during the summer, covering nearly the entire shoreline in 2023 without discovering any new plants or populations. This marks the first year with no invasive plant findings. After an additional four years with no detections, the department can declare this population eradicated.

Figure 10. Jayden Duckworth, FWP AIS Specialist, tending divers on Beaver Lake as they survey for any remaining Eurasian watermilfoil plants.

Figure 11. FWP Divers searching for Eurasian watermilfoil in shallower water near Beaver Lake's public boat ramp.

Holland Lake Fragrant Waterlily Control

Montana Fish, Wildlife & Parks remains actively engaged in collaboration with the U.S. Forest Service and Missoula County to control fragrant waterlily in Holland Lake. Isolated patches are systematically removed to curtail further expansion within the lake. Anecdotal evidence indicates that patches revisited annually are showing signs of reduced area and/or abundance. Nevertheless, several sizable patches persist, necessitating a different control strategy, likely involving herbicide application for eradication. Given the extensive growth across the lake, this project is ongoing, focused on containment until comprehensive eradication or management plans are developed in conjunction with partners.

Slip and Slide Creek Ponds Curlyleaf Pondweed Eradication

The USFS acquired property featuring three small reservoirs situated in the Slip and Slide Creek drainage, a tributary of the Yellowstone River near Gardiner, MT. Concerned about potential invasive species, USFS asked FWP to survey the reservoirs in 2019, identifying well-established curlyleaf pondweed populations in all three ponds. Classified as high-risk for dam failure, the USFS drained the ponds in 2020 and 2021 to address the dam risk and eradicate the curlyleaf pondweed. Dams were removed in 2022 and 2023, and herbicide treatment targeted remaining curlyleaf pondweed. While a few patches persist, the USFS plans to revisit the site with an updated treatment plan aiming for population eradication. FWP staff systematically inspect each pond and Slide-and-Slide Creek down to the confluence with the Yellowstone River to prevent downstream spread. To date, no additional plants have been discovered below these ponds.

Figure 12. Remnants of the dam removed at the upper Slide-and-Slide Pond. The wetland area ponded water provides a refuge for the remaining invasive curlyleaf pondweed population.

Nilan Reservoir Eurasian Watermilfoil Eradication

In October 2021, FWP identified a small population of Eurasian watermilfoil (EWM) in Nilan Reservoir, situated approximately 15 miles west of Augusta, MT, along the Rocky Mountain Front. FWP promptly initiated a rapid response eradication treatment in coordination with the Montana Department of Natural Resources (DNRC) (dam owner) and the Nilan Water Users Association (landowners and irrigators). In November 2021, FWP curtained off the bay from the rest of the reservoir to minimize water exchange and herbicide dilution and applied fluridone to the entirety of the bay.

A retreatment of the bay and adjacent area took place in August 2022. Crews conducted surveys along the entire shoreline in 2022 and removed isolated plants along the east and north outlets. In 2023, the FWP dive team revisited each isolated plant location and surveyed both areas where treatments were conducted. No Eurasian watermilfoil plants were found in the lake in 2023. If, after an additional four years, no Eurasian watermilfoil is detected in the lake, it will be declared eradicated. Further surveys and dives are planned for 2024 and beyond.

Lake Elmo Corbicula Clam Eradication

Figure 13. Live, adult Corbicula found in Lake Elmo, MT during surveys in 2021.

Until FWP staff identified Corbicula clams (Corbicula fluminea) in Lake Elmo during an AIS monitoring workshop in June 2019 (Figure 13), there were no confirmed populations of these clams in Montana. In response, FWP dewatered the lake in 2021 to address the issue and carry out site improvements. During the dewatering, FWP undertook fisheries habitat enhancements and upgraded the park with new fishing jetties, an outlet control structure, and walking paths. The irrigation district diverted water back into the lake occurred in April 2022 to refill it. In the fall of 2023, FWP staff conducted intensive sampling for clams using ponar dredges, benthic sleds, scuba surveys, and eDNA. No live clams were found in Lake Elmo in 2023 using all employed methods (Figure 14). If, after an additional four years, no live Corbicula clams are discovered in the lake, it will be declared eradicated. Further survey efforts are planned for 2024 and beyond.

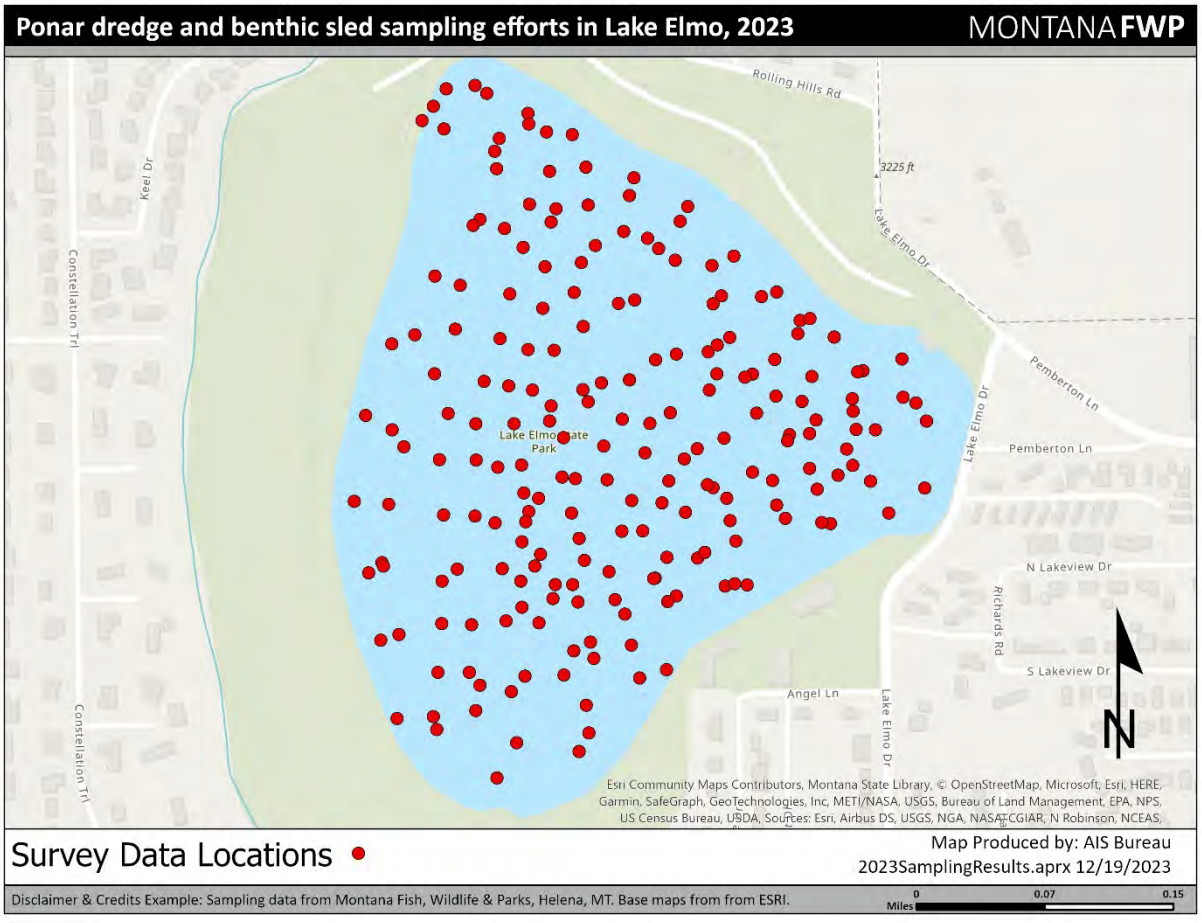


Figure 14. Sampling locations at Lake Elmo in 2023 looking for any living Corbicula. FWP staff deployed ponar dredges and benthic sleds. No live, invasive clams were found.

Looking Ahead to 2024

Fish, Wildlife & Parks consistently assesses the AIS early detection and monitoring program to identify opportunities for enhancing both efficacy and efficiency. These ongoing improvements contribute to more dependable sampling efforts, strengthened partnerships, enhanced data collection, improved sampling handling, and more effective AIS eradication and control initiatives. The FWP AIS early detection staff aims to:

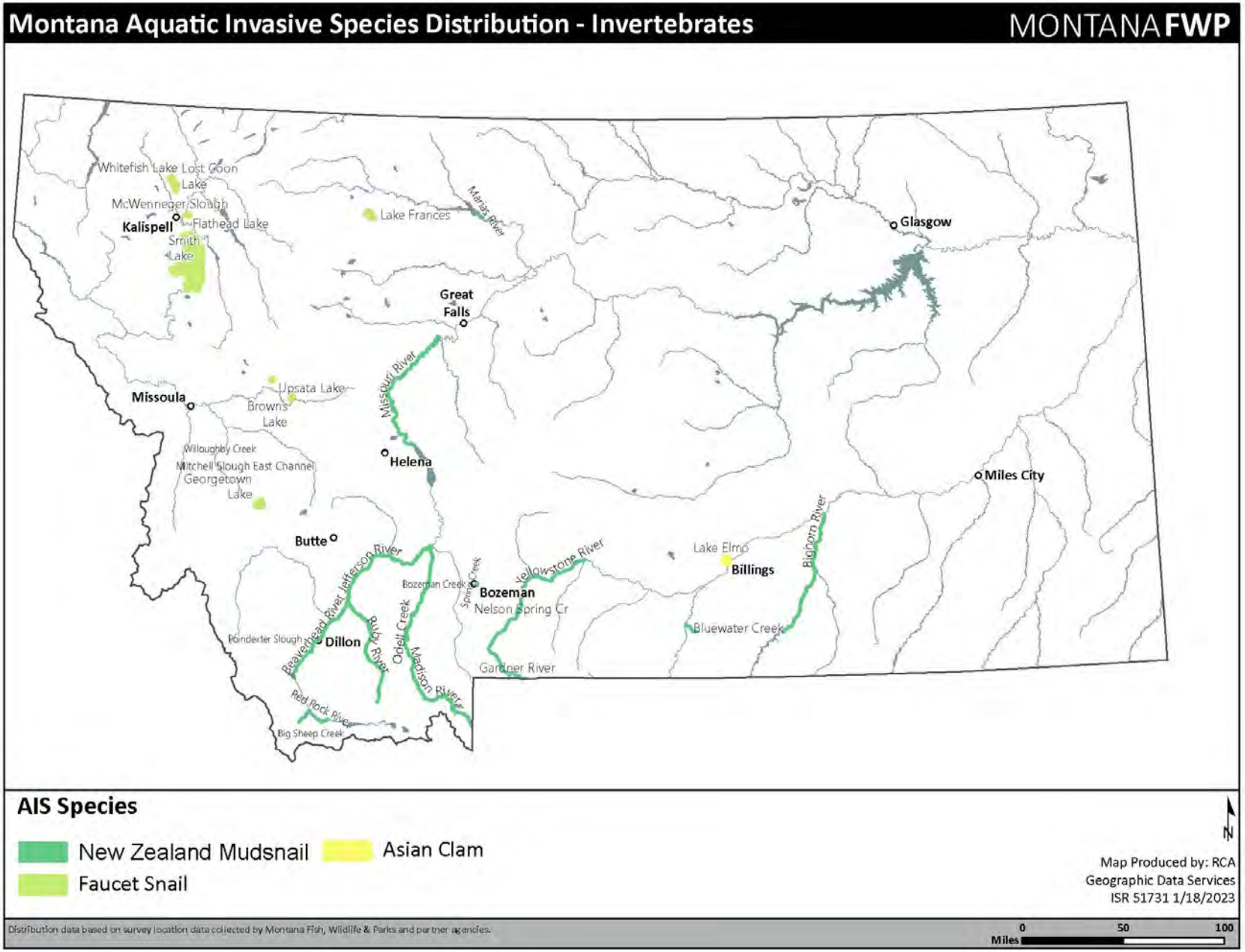
- Continue to lead state and regional AIS monitoring coordination with state and regional partners.
- Continue to offer training workshops to expand partner all-taxa AIS monitoring efforts.
- Continue to evaluate and improve biosecurity at hatchery facilities in the state.
- Initiate statewide geothermal AIS surveys.
- Advertise and find ways to increase use of the "Reporting AIS Sightings" efforts through public events and workshops. AIS sightings can also be reported online at http://cleandraindry.mt.gov/reportais
- Provide mid-season Quality Assurance/Quality Control training for seasonal staff including cross-partner trainings.
- Increase FWP's use of environmental DNA (eDNA) for early detection sampling.
- Revise FWP's early detection and sampling protocol.
- Revise FWP's AIS laboratory protocols to be up-to-date and reflect current best practices.

Montana Fish, Wildlife & Parks and collaborative partners are continually enhancing their effectiveness and expanding capacity with aim to detect new AIS populations, impede the spread of existing ones, and, where feasible, eradicate populations. Crucial to the early detection of invasive species, these endeavors are integral to both the AIS program and the statewide AIS Management Plan. While they do not guarantee the discovery of all introduced AIS species, these efforts significantly heighten the potential to identify new populations before they establish or extend beyond current boundaries. By limiting the establishment or spread of AIS, containment and potential eradication become feasible. The vigilant survey and control efforts for AIS not only save the State of Montana time and money but also safeguard its aquatic resources and infrastructure from the impacts of AIS for current citizens and future generations.

Literature Cited

Montana Fish, Wildlife & Parks. (2019). *Aquatic Invasive Species Management Program Field Sampling and Laboratory Standard Operating Procedures.* Fish, Wildlife, & Parks, Aquatic Invasive Species Bureau, Helena.

Appendix A. Map of Invasive Snails and Clams in Montana



Appendix B. Map of Invasive Aquatic Plants in Montana